

WASHINGTON

SCIENCE TRENDS

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* Military R & D Trends

✓ AUTEC -- this is the Navy's plan for an Atlantic Underwater Test and Evaluation Center, mainly for future anti-submarine warfare and missile applications. A study contract is expected to be initiated by Navy Bureau of Ships on or about November 15. Eventually the program may reach the \$100 million level.

✓ FABMDS -- this is to be a Field Army Ballistic Missile Defense System -- a "Nike-Zeus on wheels" -- which will take the place of the Plato system cancelled sometime ago. Army Ordnance officials express high hope for this system, now in the study contract phase.

✓ ASTREC -- this is an Atomic Strike Recording System now being studied by Air Force reconnaissance experts. This highly classified program is said to have originated at the Geophysics Research Directorate, L. G. Hanscom Field, Mass.

* Loran-C Space Navigation

Researchers at the National Bureau of Standards suggest that existing Loran-C ground stations and electronic clocks can be used to provide highly accurate satellite or space vehicle position determination. Signals received at four or more such stations, arriving at slightly different times, would be compared to provide this information.

The NBS method is technically known as an inverse hyperbolic system. Time of arrival of signals would be measured by pairs of receivers (tracking stations). Reception by one pair of receivers would describe a hyperbolic surface in space which is the plane of constant time difference between the stations. Two pairs of receivers -- one can be common to each pair -- provide the means to describe two such planes, and their intersection defines a line of position in space.

System would be most effective when the space vehicle is a few hundred to several thousand miles from the surface of the earth. At closer ranges conventional techniques are more accurate. Secondary advantages claimed for the system:

✓ Low Space Power Requirements -- radio signals from the space vehicle require only about one millionth-of-a-second pulse every ten seconds.

✓ Simplified Antenna -- the antenna pattern of the space vehicle would not be critical since the pulse envelope would be used in measuring time of arrival. Thus only the amplitude and not the phase is of importance.

(R&D reported by G. Hefley, R. Linfield and R. Doherty, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado)

* TECHNICAL RECRUITMENT

Congress is again pressuring the Defense Department for tighter control of "abnormally high" recruiting costs charged to defense contracts by companies which do a major share of their business with the Government. The Armed Services Procurement Regulations have never attempted to set up definite standards as a means to govern such allowances -- instead "reasonableness" is the determining factor.

In addition, the question is being raised once again as to whether intensive recruiting is causing excess turnover of personnel -- which in itself brings increased costs.

The Pentagon submitted to the House Committee on Post Office and Civil Service a summary of the experiences of 102 firms in private industry. Of these, 76 were classified as "government firms" since more than half their business was with the Federal Government. The remaining 26 companies were classified as "commercial firms" since less than half their business was with the government.

Here are the subcommittee's major findings:

- ✓ Government Contractors Spend More -- in general the contractors with predominantly government business spent more to recruit engineers and scientists than did those firms working predominantly on commercial business.
- ✓ Army Contractors Hard Hit -- separation rate of engineers and scientists was considered pretty much in line with current separation rates for private business and the Federal Government -- except for Army contractors.

Here's some comparative data:

	"Government firms"		"Commercial firms"	
	Cost per new hire	Separation rate	Cost per new hire	Separation rate
Army	\$820	21.6%	\$722	14.0%
Navy	\$969	5.4%	\$1,030	12.9%
Air Force	\$1,223	10.6%	\$708	14.1%

- ✓ More Hires than Fires -- New hires of engineers and scientists by the 102 firms in the 1959 sample exceeded in general the rate of separation of the engineers and scientists. Government contractors did relatively more hiring than other firms.

Here are the figures:

	"Government firms"		"Commercial firms"	
	Separation rate	Addition rate	Separation rate	Addition rate
Army	21.6%	32.1%	14.0%	21.4%
Navy	5.4%	20.6%	12.9%	14.9%
Air Force	10.6%	19.6%	14.1%	14.1%

- ✓ Big Spenders -- there were four firms (three of them government contractors) that spent an average of more than \$2,000 for each new scientist or engineer. There were eleven firms (all but one government contractors) that spent between \$1,500 and \$2,000.
- ✓ Possible Result -- Subcommittee Chairman James C. Davis, (D-Georgia) warns: "The high recruiting cost by many firms as well as the unusually heavy turnover of engineers and scientists in several companies, as reflected by this study, would certainly appear to warrant even more attention in negotiating contract costs, and in specific auditing by the military departments."

DATA PROCESSING TRENDS

* DEFENSE COMMUNICATIONS CONTROL CENTER -- The prime contract for the first phase of this complex system (SCIENCE TRENDS, August 15, 1960) goes to the Philco Corp. which will provide a Philco 2000 computer, six status boards to display current information received from the computer, integrated systems design and training services. Following installation, Philco will furnish operations and maintenance services for one year. Target date is March 1, 1961. Subcontractors will be the Systems Development Corp. for programming services, Hoffman Electronics Corp. as communications consultants and Dunlap and Associates for human engineering studies.

* AIR TRAFFIC CONTROL COMPUTER -- The first air traffic control computer developed for the Federal Aviation Agency by Librascope Division of General Precision Inc., will be installed early next year at the National Aviation Facilities Experimental Center (NAFEC), Atlantic City, N. J. The machine is expected to replace general purpose computers presently installed in FAA centers at New York, Chicago, Cleveland, Boston, Indianapolis, Pittsburgh and Washington, D. C. The new machine will print flight progress information, update, change and store this information, exchange it with other control facilities and warn the air traffic controller of impending flight conflicts. The computer is expected to become an important element of FAA's Data Processing Central -- a semi-automatic system for automatic air traffic control. The DPC is designed on a building block principle which is expected to make it possible to introduce specific functions into control centers as they are proved efficient and reliable.

Other parts of the system, planned for subsequent introduction, include a new device that will automatically put out flight progress information for the controller, new input devices for inserting flight plan information directly into the computer, bright "daylight" radar tubes that can be viewed in sunlight and improved communications control panels.

* RADAR DATA COMPUTER -- Elimination of human error is the goal of an experimental radar data computer which will be built for the U. S. Maritime Administration by Goodyear Aircraft at Litchfield Park, Ariz. It is anticipated that the device will indicate the course, speed, bearing and range of up to ten ships or targets in either true or relative position. In addition, it is designed to sound an alarm in the event the closest point of approach is less than a predetermined safe, anti-collision minimum. The device will automatically determine an appropriate avoidance maneuver in the event a possibility of collision is indicated.

"Success of the experimental radar computer," the Administration states "could eliminate human error in interpretation of the information contained on the ship's radar scope, and materially reduce ship collision danger."

* PROCESSING ELECTRONICS DATA -- Navy officials now have available weekly reports on every major piece of electronic equipment on board all ships in the fleet, following completion of an Electronic Installation Record System Problem on Univac.

Over five hundred thousand separate units of information are processed each week for overhaul purposes as well as management of new construction, repair parts support, engineering and logistics planning. The system formulated at the David Taylor Model Basin, Carderock, Maryland, also provides a semi-annual compilation of electronic equipment installations for use by fleet commanders as an operational guide. To insure accuracy each ship must certify a list of equipment on board after overhaul. Approximately 40 hours of computer time is required to process the 400 pages of weekly reports. It is estimated that doubling the amount of data would add less than four hours to the required weekly machine time -- and new computers could give still greater service.

T E C H N I C A L T R E N D S

- The Atomic Energy Commission has cancelled design work on its water-cooled reactor test plant which had been planned for use in connection with the Army's field nuclear power plant program. The Nuclear Test Plant (NTP) would have included extensive instrumentation to facilitate full-scale testing of prototype reacting cores and reactor control systems of varied designs. ✓✓✓ Norair Division of Northrop Corp. is building a 10-foot diameter sphere of bonded sandwich-type fiberglass honeycomb to test human tolerance to rotational conditions of up to 70 rpm. The simulator, being built for the School of Aviation Medicine, Brooks Air Force Base, Texas, will ride on a virtually frictionless stream of air. Control and rotation will be provided by three inertia rings rotating within the inner surface of the sphere.
- Armour Research Foundation is building a prototype satellite instrument package for Wright Air Development Division, U. S. Air Force. A flight model will monitor the electromagnetic environment of the satellite over selected ranges of the frequency spectrum as it passes through space. Information, expected to be useful in the design of future communications systems, will be stored on tape in digital form and played back to an earth station upon command. Flight model is expected to be less than one hundred pounds in weight and not more than two cubic feet in volume, exclusive of power supply. ✓✓✓ The Justice Department has charged that possession of a patent license and alleged exclusive control of dicyandiamide by American Cyanamid has led to a monopoly in trade in melamine and melamine products.
- The Commerce Department expects the export business of the U. S. aeronautical industry to reach a peak of \$1.4 billion this year, although company officials are less than happy with what they consider to be trade handicaps. At a conference in Washington, D. C., they reported some tariff difficulties with rates on aircraft running up to more than fifty percent. The industry's greatest need, it was stated is for more liberalized government credit guarantees than are presently available from the U. S. Export-Import bank to finance sales abroad. It was pointed out that the U. S. airplane industry, privately owned, must compete in the world markets with aircraft produced by government or subsidized factories.
- The Air Force has confirmed that it is developing a prototype launcher to permit the F-105 Thunderchief tactical fighter to be armed with the air-to-surface Bullpup missile. The launcher is expected to be located on pylons beneath the wing -- as it is on the F-100. Bullpup in its GAM-83A version carries a high explosive warhead and an 83B version, under advanced development will carry either a nuclear or a conventional warhead. The missile employs a cockpit radio link guidance system and can be launched by the pilot "more than two miles" from a target. ✓✓✓ Approximately 44 percent of the accidents in U. S. Naval Aviation last year involved material failure or malfunction. About one out of six involved engine failure, while landing gear troubles accounted for eight percent of the total. Some part of the fuel system was involved in 10 percent of all first-line carrier jet aircraft accidents.
- A new aircraft fire and rescue program at the Federal Aviation Agency, Washington 25, D. C. will be headed by John W. Bridges. The new unit will develop an airport safety program, including airport ground safety standards and the development of equipment. ✓✓✓ U. S. Air Force has renewed its contract with Lockheed Aircraft for operation of the Georgia Nuclear Laboratories, an irradiation testing, research and development facility. Attempts were made earlier this year to have the Laboratory closed.

ROYALTY-FREE PATENT CHECKLIST

Here is a new listing of Government-owned patents now available for use by industry on a royalty-free basis. Subscribers desiring further information may write Service Department, Washington SCIENCE TRENDS, 1120 National Press Bldg., Washington 4, D. C.

You will be furnished with the patent number and classification, and information on where to obtain the patent, and where to apply for licensing.

- () REMOVING CARBON DEPOSITS: This patent covers a solvent for removing carbon deposits from parts of an internal combustion engine. Main ingredients are monoethanolamine and ethylene glycol monobutyl ether.
- () CAMERA SYNCHRONIZER: This system uses an inductance probe to synchronize a precise location on the film with an event to be filmed by a high speed motion picture camera.
- () CONDUCTIVE LATEX FILMS: This patent describes a method of preparing electrically conductive latex films which are stable in the presence of moisture. The films are prepared from an aqueous compound polychloroprene latex composition containing water-soluble ingredients and disperse conducting carbon particles.
- () VIBRATION DEVICE: This apparatus induces and measures vibrations in an object. A vibrator is pressed against the object under test, a stem is forced back, and a pin on a displacement guide forces an extended portion of a pole piece against an opposing pole piece. This closes a circuit and energizes an electromagnet.
- () SULFOXIDES AND SULFONES: The compositions covered by this patent are said to be useful in preparing metallic salts for soaps, surface active agents, jelling agents, anti-bacterial agents, esters for plasticizers and lubricant additives -- and amine derivatives for polymerization accelerators.
- () HIGH PERFORMANCE FILTER: This patent describes a piezoelectric disc assembly said to provide a high performance filter. It consists of a number of discs in a sleeve. A spring contact is positioned between each pair of adjacent discs and the end caps for the sleeves have contacts and electrical leads for connection with the end discs.
- () AIRCRAFT DUCT MOUNTING: This flexible duct mounting is designed for fluid installations in aircraft engines and is said to be capable of compensating for both vibration and temperature changes.
- () BREAK-AWAY ELECTRICAL CONNECTOR: This connector consists of a pair of plugs which use butt-type electrical contacts and yieldably releasable plug connections. The combination enables the plug to be connected and releasably lock together.
- () MAGNESIUM SURFACE COATING: This patent is said to enable magnesium to be protected from corrosion on contact with moist air or exposure to salt fog. An aqueous solution consisting of sodium pyrophosphate, sodium fluoride and nickel sulphate is employed.

P U B L I C A T I O N C H E C K L I S T

- ☐ SPACE MEDICINE RESEARCH, the texts of hearings held earlier this year on Army, Navy and Air Force programs concerned with the biomedical aspects of space exploration. 70 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Bldg., Washington 25, D. C. for Hearings No. 12-Space Medicine Research)
- ☐ CHROMITE ORES, details of laboratory tests which showed that flotation methods are technically feasible for the recovery of fine-grained disseminated ores found in the Pacific Northwest. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigations No. 5646)
- ☐ HIGHWAY RESEARCH, a report on the use of steel-tired rollers and two-way radio in highway construction projects. 44 Pages. 80 Cents. (Write National Academy of Sciences, 2101 Constitution Avenue, N. W., Washington 25, D. C., Attn: Publications Office for HRB Special Report No. 54)
- ☐ ELECTRON TUBES AND SEMICONDUCTORS, foreign market surveys presenting information on production, consumption and trade. Publication 12S covers selected European countries. Publication 13S covers selected Latin American Countries. (Order at 25 cents each through Superintendent of Documents, Government Printing Office, Washington 25, D. C.)
- ☐ METALWORKING MACHINERY, a Defense Department listing of U. S. and foreign manufacturers with metalworking machinery, showing equipment and code numbers and related information useful for mobilization and production planning. Two volumes. 1,620 Pages. \$7.50 per set. (Available through military channels or from Superintendent of Documents, Government Printing Office, Washington 25, D. C.)
- ☐ BLASTING AGENTS, detailed tentative safety recommendations for field-mixed ammonium nitrate blasting agents. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Inf. Circular No. 7988)
- ☐ DEFENSE EMPLOYMENT - CONFLICT OF INTEREST, statements, testimony and exhibits on the knotty problem of businessmen in government, with particular emphasis on Defense Department agencies hiring of officials from firms of leading Defense Contractors. 82 Pages. Single Copies Free. (Write Committee on Government Operations, U. S. House of Representatives, Washington 25, D. C. for Hearings - Exemptions from Conflict-of-Interest)
- ☐ ELECTRONIC COOLING SYSTEMS, an Air Force study of cooling systems for electronic equipment for vehicles operating at Mach 8.0 to 20, at altitudes from 80,000 to 200,000 feet. Compares expendable heat sink materials, pressurization gases, heat transport fluids and several "simplified" cooling systems. 165 Pages. (WADC Technical Report 59-253 available through military channels or at \$3 from OTS, U. S. Department of Commerce, Washington 25, D. C.)
- ☐ STRATEGIC GRAPHITE, a discussion of the nature, commercial grades and uses of graphite and information on domestic deposits. 120 Pages. \$1.25. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. I 19.3:1082-E)

